ISO TC 184 N 842 - ISO TC 184/AG N
ISO TC 184/SC 4 N1209

ISO TC184 / SC4

REPORT OF THE SECRETARIAT

September 2001

Technical Committee 184: Industrial Automation Systems and Integration

Subcommittee 4: Industrial Data

Scope:
Standardization of information which is shared or exchanged in the area of industrial and manufacturing applications. Three areas of scope have been approved for SC4:

- Product Data
- Industrial Manufacturing Management Data
- Global Manufacturing Programming Language

Chairman:
Howard Mason of BAE SYSTEMS was elected to serve as the Chairman of SC4 in August, 2000.

Secretariat:
The American National Standards Institute (ANSI), the United States P-member, holds the ISO TC 184/SC4 Secretariat. The Defense Information Systems Agency (DISA) administers this Secretariat on behalf of ANSI. Mr. Jerry Smith is the SC4 Secretary.

Membership:
Approximately two hundred and twenty experts from thirty-one countries are involved with the work of the SC4 committee. Eighteen of these countries are classified as Participating Members (P-members) and thirteen as Observers (O-members). Active liaisons are maintained with thirty other standards-developing or international consortium organizations.

P-members:
Australia, Canada, China, Czech Republic, France, Germany, Italy, Japan, Republic of Korea, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, United Kingdom, United States

O-members:
Belgium, Brazil, Bulgaria, Denmark, Finland, Hong Kong, Hungary, Lithuania, Malaysia, Mongolia, Romania, Singapore, Yugoslavia

A-Liaisons:

ISO TC8	Ships and marine technology
ISO TC10/S	Basic conventions
ISO TC10/SC6	Mechanical engineering documentation
ISO TC10/SC8	Construction documentation
ISO TC10/SC10	Process plant documentation and tpd-symbols
ISO TC29/WG34	Small tools Computerized machining data exchange
ISO TC172/SC1	Optics and optical instruments/Fundamental standards
ISO TC184/SC1	Physical device control
ISO TC184/SC2	Robots for manufacturing environment
ISO TC184/SC5	Architecture, Communications, and Integration Framework
ISO TC207/ SC5	Life cycle assessment
ISO TC 211	Geographic information/Geomatics
ISO TC 213	Dimensional and geometrical product specifications and verification
IEC TC3B	Documentation and Graphic Symbols
IEC TC93	
ISO/IEC JTC1 SC34	Document Description Languages
AECMA	European Association of Aerospace Industries
EMSA	European Marine STEP Association
EPISTLE	European Process Industries STEP Technical Liaison Executive
FSIG	funStep Interest Group
IAI	Industry Alliance for Interoperability
INCOSE	International Council on Systems Engineering
NAFEMS	International Association for Engineering Analysis
OMG	Object Management Group
PDES Inc.	Product Data Exchange using STEP, Inc.
PIEBASE	Process Industries Executive for Achieving Business Advantage Using Standards for Data Exchange
PLCS	Product Life Cycle Support
POSC	Petrotechnical Open Systems Corporation
ProSTEP Association	
VAMAS	Versailles Project on Advanced Materials and Standards

Work Items:

There are currently six standards being developed under ISO TC 184/SC4's domain of interest:

- ISO 10303, Product Data Representation and Exchange
- ISO 13584, Parts Library
- ISO 15531, Industrial Manufacturing Management Data
- ISO 15926, Integration of life-cycle data for oil and gas production facilities
- ISO 18629, Process specification language
- ISO 18876, Technical Specifications: Integration of industrial data for exchange, access, and sharing

In addition, the number 20303 has been assigned for the next version of EXPRESS, and 20542 for an initial PAS, based on the AP233 development.
A procedure for adopting appropriate specifications developed by external organisations has been put in place, and it is expected that the first specifications will be submitted for processing by the end of 2001.

Six **new work items** have been formally approved by SC4 since September 2000:

- ***10303-35*** *Conformance testing methodology and framework: Abstract test methods for standard data access interface implementations (restart after 7 year cancellation)*
- ***10303-109*** *STEP Assembly Model for Products*
- ***10303-215*** *Application protocol: Ship arrangement (restart after 7 year cancellation)*
- ***10303-216*** *Application protocol: Ship moulded forms (restart after 7 year cancellation)*
- ***10303-218*** *Application protocol: Ship structures (restart after 7 year cancellation)*
- ***13584 -25*** *Logical resources: Logical model of supplier library with aggregate values and explicit content*

A New Work Item on *Computational Fluid Dynamics Data* is also likely to be approved.

The preliminary work item on Rapid Prototyping for Layered Manufacturing (RPLM) has been approved by SC4 since September 2000, and a proposal for an extension to the scope of AP224 to include Gear Manufacturing Features is currently under ballot.

Organization:
The work of SC4 is progressed under the organizational structure of five working groups, two joint working groups, and a Quality Committee. These efforts include any work intending to lead to the issue of a new, amended, or revised International Standard; or work resulting in the publication of a Technical Report. In addition, a series of SC4 Standing Documents has been prepared to assist the SC4 technical experts and other standards groups in developing international standards. The working groups are:

WG2: Parts Library
WG3: Product Modelling
JWG8: Industrial Manufacturing Management Data
JWG9: Electrical and Electronic Applications
WG10: Technical Architecture
WG11: EXPRESS Language, Implementation Methods, and Conformance Methods
WG12: SC4 Common Resources
Quality Committee
Policy and Planning Committee

Projects:
Nearly 130 projects are now being worked, at various levels of activity, by SC4. A current status of all projects in the SC4 work programme can be found in the Annex to this report. More detailed reports on all the SC4 projects can be found in the SC4 project management database.

ISO TC 184/SC4 and SC4 Working Group Meetings Held:
ISO TC184/SC4 and its associated working groups have been holding one to several meetings per year since the subcommittee structure was formed in 1984. A list of these meetings can be found at http://www.mel.nist.gov/sc4/www/meetings.htm.
The following meetings for SC4 or its working groups are anticipated:

DATE	LOCATION	LEVEL of MEETING
2001-09-30/10-05	Japan	SC4 and WGs
2002-02-25/03-01	USA	SC4 and WGs
2002-06-09/15	Sweden	SC4 and WGs
2002-11-3/8	Korea	SC4 and WGs
2003-03	USA	TBD
2003-06	Germany	TBD
2003-10	China	TBD
2004-03	USA	TBD
2004-06	UK	TBD

Future Directions:
The second major release of STEP (ISO 10303) is now available. Future developments of the SC4 standards will be designed to deliver significant increments of industrial capability, as well as incorporating enhancements to internal working processes and publication techniques, such as the development of stable information modules. An important extension will see the mapping of STEP information models to XML, to facilitate their exploitation over the Web.

Possible future areas of work include an integration of manufacturing capabilities, a generic definition of connectivity, and representation of non-geometric information.

SC4 already makes extensive use of electronic techniques for standards development, balloting and comment resolution, with a comprehensive programme management database used to monitor progress and ensure efficient operation. These processes have been amended to support the new ISO electronic balloting procedures and sustain an effective interface with the national bodies. ISO has permitted SC4 to publish its standards in HTML format, and pilot use is being made of XML for authoring, to facilitate the consistent generation of different documentation forms from a single source text. In addition, the information models are being held in opensource repositories to encourage exploitation.

As the implementation of SC4 standards increases, the need for interaction with base IT standards developed in both de facto and de jure environments increases. This is recognized by the Subcommittee, which is taking steps to establish the necessary links and also provides a mechanism for external bodies to submit relevant related specifications to the ISO process through SC4.

SC4 is also facing an increasing requirement for liaisons with other ISO groups involved with more traditional definition of products. The deliverables from SC4 provide a firm basis for definition of product data in a digital form, and this should be exploited by other ISO groups with such a requirement, to support the integration of engineering information required by industry. Guidelines for managing such projects external to SC4 have been created and approved by TC184.

SC4 Project Status Summary Report

Project Number	Title	Status
Approved Work Items (Total projects: 13)		
10303-0025	Implementation methods: EXPRESS to OMG XMI binding	20.00
10303-0052	Integrated Application Resource: Computational Fluid Dynamics Data	20.00
10303-0053	Integrated Resource: Numerical Analysis	20.00
10303-0109	STEP Assembly Model for Products	20.00
10303-0110	Integrated Application Resource: Computational Fluid Dynamics Data	20.00
10303-0227 ed2	Application protocol: Plant spatial configuration	20.00
10303-0234	Application protocol: Ship operational logs, records, and messages	20.00
10303-0236	Application protocol: Furniture product data and project data	20.00
10303-0237	Fluid Dynamics Application Protocol	20.00
10303-0318	Abstract test suite: Ship structures	20.00
10303-0324 ed2	Abstract test suite: Mechanical product definition for process plans using machining features: Edition 2	20.00
10303-0333	Abstract test suite: Systems engineering data representation	10.99
15531-0033	Manufacturing resources usage management data: Conformance testing	20.00
Working Draft (Total projects: 9)		
10303-0108	Integrated application resources: Parameterization and constraints for explicit geometric product models	20.20
10303-0226	Application protocol: Ship mechanical systems	20.20
10303-0235	Application protocol: Materials information for the design and verification of products	20.20
10303-0305	Abstract test suite: Mechanical design using surface representation	20.95
10303-0336	Abstract test suite: Furniture product data and project data	20.20
15531-0042	Manufacturing flow management data: Time model	20.20
15531-0043	Manufacturing flow management data: Conceptual model for flow monitoring and manufacturing data exchange	20.20
20303-0011	Description methods: The EXPRESS language reference manual, 3rd edition	20.20
20542-	Application protocol: Systems engineering data representation	20.20
Committee Draft (Total projects: 15)		
10303-0011 tc2	Description methods: The EXPRESS language reference manual	30.95

10303-0014	Description methods: The EXPRESS-X language reference manual	30.95
10303-0035	Conformance testing methodology and framework: Abstract test methods for standard data access interface implementations	30.20
10303-0051	Product data representation and exchange: Integrated generic resource: Mathematical description	30.15
10303-0107	Integrated application resource: Finite element analysis definition relationships	30.15
10303-0215	Application protocol: Ship arrangement	30.10
10303-0216	Application protocol: Ship moulded forms	30.95
10303-0218	Application protocol: Ship structures	30.95
10303-0221	Application protocol: Functional data and their schematic representation for process plant	30.60
13584-0102	View exchange protocol: View exchange protocol by ISO 10303 conforming specification	30.95
15531-0021	Production data for external exchange: Basic principles and manufacturing BSU's	30.92
15531-0031	Manufacturing resources usage management data: Resources information model basic principles	30.20
15531-0032	Manufacturing resources usage management data: Conceptual model for resources usage management data	30.40
15531-0041	Manufacturing flow management data: Basic concepts and model presentation	30.92
18629-001	Process Specification Language	30.20

Technical Reports and Specifications (Total projects: 78)

10303-0028	Conformance testing methodology and framework: Abstract test methods	30.92
10303-0029	Implementation methods: Lightweight Java programming language binding to the standard data access interface with Internet/Intranet extensions	30.60
10303-0302	Abstract test suite: Associative draughting	30.60
10303-0312	Abstract test suite: Electrotechnical design and installation	30.20
10303-0325	Abstract test suite: Building elements using explicit shape representation	30.60
10303-0332	Abstract test suite: Technical data packaging core information and exchange	30.20
10303-1001	Application module:Appearance assignment	30.20
10303-1002	Application module:Colour	30.20
10303-1003	Application module:Curve appearance	30.20
10303-1004	Application module:Elemental shape	30.20
10303-1005	Application module:Elemental topological shape	30.20
10303-1006	Application module:Foundation representation	30.20

10303-1007	Application module:General surface appearance	30.20
10303-1008	Application module:Layer assignment	30.20
10303-1009	Application module:Shape appearance and layers	30.20
10303-1010	Application module:Date time	30.20
10303-1011	Application module:Person organisation	30.20
10303-1012	Application module:Approval	30.20
10303-1013	Application module:Person organisation assignment	30.20
10303-1014	Application module:Date time assignment	30.20
10303-1015	Application module:Security classification	30.20
10303-1016	Application module:Product categorisation	30.20
10303-1017	Application module:Product identification	30.20
10303-1018	Application module:Product version	30.20
10303-1019	Application module:Product view definition	30.20
10303-1020	Application module:Product version structure	30.20
10303-1021	Application module:Identification assignment	30.20
10303-1022	Application module:Part and version identification	30.20
10303-1023	Application module:Part view definition	30.20
10303-1024	Application module: Product structure	30.20
10303-1025	Application module:Alias identification	30.20
10303-1026	Application module:Part structure	30.20
10303-1027	Application module:Part occurrence	30.20
10303-1028	Application module:Geometric shape with topology	30.20
10303-1029	Application module:Boundary representation model	30.20
10303-1030	Application module:Property assignment	30.20
10303-1031	Application module:Property representation	30.20
10303-1032	Application module:Shape property assignment	30.20
10303-1033	Application module:Shape property representation	30.20
10303-1034	Application module:Product view definition properties	30.20
10303-1035	Application module:Product view definition structure properties	30.20
10303-1036	Application module:Independent property	30.20
10303-1037	Application module:Independent property usage	30.20
10303-1038	Application module:Independent property representation	30.20

10303-1039	Application module:Geometric validation property representation	30.20
10303-1040	Application module:Process property assignment	30.20
10303-1041	Application module:Product view definition structure	30.20
10303-1042	Application module:Work request	30.20
10303-1043	Application module:Work order	30.20
10303-1044	Application module:Certification	30.20
10303-1056	Application module:End item identification	30.20
10303-1057	Application module:Effectivity	30.20
10303-1058	Application module:Configuration effectivity	30.20
10303-1059	Application module:Effectivity application	30.20
10303-1060	Application module:Product concept identification	30.20
10303-1064	Application module:Event	30.20
10303-1065	Application module:Time Interval	30.20
10303-1066	Application module:Constructive solid geometry	30.20
10303-1068	Application module:Constructive solid geometry 3d	30.20
10303-1069	Application module:Faceted boundary representation model -	30.20
10303-1121	Application module:Document and version	30.20
10303-1122	Application module:Document assignment	30.20
10303-1123	Application module:Document definition	30.20
10303-1124	Application module:Document structure	30.20
10303-1125	Application module:File properties	30.20
10303-1126	Application module:Document properties	30.20
10303-1127	Application module:File identification	30.20
10303-1128	Application module:External item identification assignment	30.20
10303-1501	Application module:Edge based wireframe	30.20
10303-1502	Application module:Shell based wireframe	30.20
10303-1507	Application module:Geometrically bounded surface	30.20
10303-1509	Application module:Manifold surface	30.20
10303-1510	Application module:Geometrically bounded wireframe	30.20
10303-1511	Application module:Topologically bounded surface	30.20
10303-1512	Application module:Faceted boundary representation	30.20
10303-1514	Application module:Advanced boundary representation	30.20

18876-0001	Integation of industrial data for exchange, access, and sharing Part 1 - Architecture overview and description	30.20
18876-0002	Integation of industrial data for exchange, access, and sharing Part 2 - Integration and mapping methodology	30.20

Draft International Status (Total projects:10)

10303-0011 ed2	Description methods: The EXPRESS language reference manual, 2nd edition	30.99
10303-0204	Application protocol: Mechanical design using boundary representation	40.95
10303-0209	Application protocol: Composite and metallic structural analysis and related design	40.92
10303-0232	Application protocol: Technical data packaging core information and exchange	40.95
10303-0518	Application interpreted construct:Mechanical design shaded presentation	40.60
13584-0024	Logical resource: Logical model of supplier library	40.92
13584-0101	View exchange protocol: Geometric view exchange protocol by parametric program	40.60
15531-0001	General overview	40.60
15926-0001	Overview and fundamental principles	30.99
15926-0002	Data model	40.00

Final Draft International Standard or Proof (Total projects: 3)

10303-0021 ed2	Implementation methods: Clear text encoding of the exchange structure: Edition 2	40.99
10303-0050	Integrated generic resources: Mathematical constructs	50.20
10303-0314	Abstract test suite: Core data for automotive mechanical design processes	50.00

International Status (Total projects: 64)

10303-0001	Overview and fundamental principles	90.93
10303-0011	Description methods: The EXPRESS language reference manual	90.93
10303-0012	Description methods: The EXPRESS-I language reference manual	60.60
10303-0021	Implementation methods: Clear text encoding of the exchange structure	60.60
10303-0022	Implementation methods: Standard data access interface specification	60.60
10303-0023	Implementation methods: C++ language binding to the standard data access interface	60.60
10303-0024	Implementation methods: C language binding to the standard data access interface	50.99
10303-0027	Implementation methods: Java programming language binding to the standard data access interface with Internet/Intranet extensions	60.60

10303-0031	Conformance testing methodology and framework: General concepts	90.93
10303-0032	Conformance testing methodology and framework: Requirements on testing laboratories and clients	60.60
10303-0034	Conformance testing methodology and framework: Abstract test methods	60.60
10303-0041	Integrated generic resources: Fundamentals of product description and support	90.92
10303-0041 ed2	Integrated generic resources: Fundamentals of product description and support (Revision of ISO 10303-41: 1994)	60.60
10303-0042	Integrated generic resources: Geometric and topological representation	90.92
10303-0042 ed2	Integrated generic resources: Geometric and topological representation (Revision of ISO 10303-42:1994)	60.60
10303-0043	Integrated generic resources: Representation structures	90.92
10303-0043 ed2	Integrated generic resources: Representation structures (Revision of ISO 10303-43:1994)	60.60
10303-0044	Integrated generic resources: Product structure configuration	90.92
10303-0044 ed2	Integrated generic resources: Product structure configuration (Revision of ISO 10303-44: 1994)	60.60
10303-0045	Integrated generic resources: Materials	60.60
10303-0046	Integrated generic resources: Visual presentation	90.93
10303-0047	Integrated generic resources: Shape variation tolerances	60.60
10303-0049	Integrated generic resources: Process structure and properties	60.60
10303-0101	Integrated application resources: Draughting	90.93
10303-0104	Integrated application resources: Finite element analysis	60.60
10303-0105	Integrated application resources: Kinematics	90.20
10303-0201	Application protocol: Explicit draughting	90.93
10303-0202	Application protocol: Associative draughting	90.20
10303-0203	Application protocol: Configuration controlled 3D designs of mechanical parts and assemblies	90.93
10303-0203 am1	Application protocol: Configuration controlled 3D designs of mechanical parts and assemblies	60.60
10303-0207	Application protocol: Sheet metal die planning and design	60.60
10303-0210	Application protocol: Electronic assembly, interconnect, and packaging design	60.60
10303-0212	Application protocol: Electrotechnical design and installation	60.60
10303-0214	Application protocol: Core data for automotive mechanical design processes	60.60
10303-0224	Application protocol: Mechanical product definition for process plans using machining features	60.60
10303-0224 ed2	Application protocol: Mechanical product definition for process plans using machining features: Edition 2.	60.60

10303-0225	Application protocol: Building elements using explicit shape representation	60.60
10303-0227	Application protocol: Plant spatial configuration	60.60
10303-0304	Abstract test suite: Mechanical design using boundary representation	60.60
10303-0307	Abstract test suite: Sheet metal die planning and design	60.60
10303-0324	Abstract test suite: Mechanical product definition for process plans using machining features	60.60
10303-0501	Application interpreted construct: Edge-based wireframe	60.60
10303-0502	Application interpreted construct: Shell-based wireframe	60.60
10303-0503	Application interpreted construct: Geometrically bounded 2D wireframe	60.60
10303-0504	Application interpreted construct: Draughting annotation	60.60
10303-0505	Application interpreted construct: Drawing structure and administration	60.60
10303-0506	Application interpreted construct: Draughting elements	60.60
10303-0507	Application interpreted construct: Geometrically bounded surface	60.60
10303-0508	Application interpreted construct: Non-manifold surface	60.60
10303-0509	Application interpreted construct: Manifold surface	60.60
10303-0510	Application interpreted construct: Geometrically bounded wireframe	60.60
10303-0511	Application interpreted construct: Topologically bounded surface	60.60
10303-0512	Application interpreted construct: Faceted boundary representation	60.60
10303-0513	Application interpreted construct: Elementary boundary representation	60.60
10303-0514	Application interpreted construct: Advanced boundary representation	60.60
10303-0515	Application interpreted construct: Constructive solid geometry	60.60
10303-0517	Application interpreted construct:Mechanical design geometric presentation	60.60
10303-0519	Application interpreted construct:Geometric tolerances	60.60
10303-0520	Application interpreted construct:Associative draughting elements	60.60
13584-0001	Overview and fundamental principles	60.60
13584-0020	Logical resource: Logical model of expressions	60.60
13584-0026	Logical resource: Information Supplier identification	60.60
13584-0031	Implementation resource: Geometric programming interface	60.60
13584-0042	Description methodology: Methodology for structuring part families	60.60